

405 KAR 3:111. Disposal of excess rock and earth.

RELATES TO: KRS 350.151

STATUTORY AUTHORITY: KRS 350.151

NECESSITY, FUNCTION, AND CONFORMITY: KRS 350.151 requires the Environmental and Public Protection Cabinet to adopt rules and administrative regulations for the surface effects of underground mining. This administrative regulation sets forth requirements for the disposal of excess rock and earth.

Section 1. Definitions. (1) "Head-of-hollow fill" means a fill structure consisting of any material, other than coal processing waste and organic material, placed in the uppermost reaches of a hollow where side slopes of the existing hollow measured at the steepest point are greater than twenty (20) degrees or the average slope of the profile of the hollow from the toe of the fill to the top of the fill is greater than ten (10) degrees. In fills with less than 250,000 cubic yards of material, the top surface of the fill may be at the elevation of the bench of the face-up area. In all other head-of-hollow fills, the top surface of the fill, when completed, is at approximately the same elevation as the adjacent ridge line, and no significant area of natural drainage occurs above the fill draining into the fill area.

(2) "Valley fill" means a fill structure consisting of any material other than coal waste and organic material that is placed in a valley where side slopes of the existing valley measured at the steepest point are greater than twenty (20) degrees or the average slope of the profile of the valley from the toe of the fill to the top of the fill is greater than ten (10) degrees.

Section 2. General Requirements. (1) Excess rock and earth materials produced from an underground mine and not disposed of in underground workings or not used in backfilling and grading operations to achieve the approximate original contour within the area where overburden has been removed shall be hauled or conveyed to and placed in designated disposal areas within a permit area, if the disposal areas are authorized for such purposes in the approved permit application in accordance with this administrative regulation. The excess rock and earth materials shall be placed in a controlled manner to ensure:

(a) That leachate and surface run-off from the fill will not degrade surface or groundwaters or exceed the effluent limitations of 405 KAR 3:140, Section 1;

(b) Stability of the fill; and

(c) That the land mass designated as the disposal area is suitable for reclamation and revegetation compatible with the natural surroundings.

(2) The fill shall be designed using recognized professional standards, certified by a registered professional engineer, and approved by the cabinet.

(3) All vegetative and organic materials shall be removed from the disposal area and the topsoil shall be removed, segregated, and stored or replaced under 405 KAR 3:080, Section 1. If approved by the cabinet, organic material may be used as mulch or may be included in the topsoil to control erosion, promote growth of vegetation, or increase the moisture retention of the soil.

(4) Slope protection shall be provided to minimize surface-erosion at the site. Diversion design shall conform with the requirements of 405 KAR 3:160, Section 1. All disturbed areas, including diversion ditches that are not riprapped, shall be vegetated upon completion of construction.

(5) The disposal areas shall be located on the most moderately sloping and naturally stable areas available as approved by the cabinet. If such placement provides additional stability and prevents mass movement, fill materials suitable for disposal shall be placed upon or above a natural terrace, bench, or berm.

(6) The excess rock and earth materials shall be hauled or conveyed and placed in horizontal lifts in a controlled manner, concurrently compacted as necessary to ensure mass stability and prevent

mass movement, covered, and graded to allow surface and subsurface drainage to be compatible with the natural surroundings and ensure a long-term static safety factor of one and five-tenths (1.5).

(7) No depressions or impoundments shall be allowed on the completed fill.

(8) Terraces may be utilized to control erosion and enhance stability if approved by the cabinet and consistent with 405 KAR 3:100, Section 4(2).

(9) Where the slope in the disposal area exceeds 1v:2.8h (thirty-six (36) percent), or such lesser slope as may be designated by the cabinet based on local conditions, keyway cuts (excavations to stable bedrock) or rock toe buttresses shall be constructed to stabilize the fill. Where the toe of the spoil rests on a downslope, stability analyses shall be performed to determine the size of rock toe buttresses and keyway cuts.

(10) The fill shall be inspected for stability by a registered engineer or other qualified professional specialist experienced in the construction of earth and rockfill embankments at least quarterly throughout construction and during the following critical construction periods: removal of all organic material and topsoil; placement of underdrainage systems; installation of surface drainage systems; placement and compaction of fill materials; and revegetation. The registered engineer or other qualified professional specialist shall provide to the cabinet a certified report within two (2) weeks after each inspection that the fill has been constructed as specified in the design approved by the cabinet. A copy of the report shall be retained at the mine site.

(11) Coal processing wastes shall not be disposed of in head-of-hollow or valley fills, and may only be disposed of in other excess spoil fills, if such waste is:

(a) Demonstrated to be nontoxic and nonacid forming; and

(b) Demonstrated to be consistent with the design stability of the fill.

(12) If the disposal area contains springs, natural or manmade watercourses, or wet-weather seeps, an underdrain system consisting of durable rock shall be constructed from the wet areas in a manner that prevents infiltration of the water into the spoil material. The underdrain system shall be protected by an adequate filter and shall be designed and constructed using standard geotechnical engineering methods.

(13) The foundation and abutments of the fill shall be stable under all conditions of construction and operation. Sufficient foundation investigation and laboratory testing of foundation materials shall be performed in order to determine the design requirements for stability of the foundation. Analyses of foundation conditions shall include the effect of underground mine workings, if any, upon the stability of the structure.

(14) Excess rock and earth materials may be returned to underground mine workings, but only in accordance with a disposal program approved by the cabinet and the Mine Safety and Health Administration.

Section 3. Valley Fills. Disposal of excess rock and earth materials in valley fills shall meet all requirements of Section 2 of this administrative regulation and the additional requirements of this section.

(1) The fill shall be designed to attain a long-term static safety factor of 1.5 based upon data obtained from subsurface exploration, geotechnical testing, foundation design, and accepted engineering analyses.

(2) A subdrainage system for the fill shall be constructed in accordance with the following:

(a) A system of underdrains constructed of durable rock shall meet the requirements of paragraph

(d) of this subsection and:

1. Be installed along the natural drainage system;

2. Extend from the toe to the head of the fill; and

3. Contain lateral drains to each area of potential drainage or seepage.

(b) A filter system to insure the proper functioning of the rock underdrain system shall be de-

signed and constructed using standard geotechnical engineering methods.

(c) In constructing the underdrains, no more than ten (10) percent of the rock may be less than twelve (12) inches in size and no single rock may be larger than twenty-five (25) percent of the width of the drain. Rock used in underdrains shall meet the requirements of paragraph (d) of this subsection. The minimum size of the main underdrain shall be as specified in Appendix A.

(d) Underdrains shall consist of nondegradable, nonacid or toxic forming rock such as natural sand and gravel, sandstone, limestone, or other durable rock that will not slake in water and will be free of coal, clay or shale.

(3) Excess rock and earth material shall be hauled or conveyed and placed in a controlled manner and concurrently compacted as specified by the cabinet, in lifts no greater than four (4) feet or less if required by the cabinet in order to:

- (a) Achieve the densities designed to ensure mass stability;
- (b) Prevent mass movement;
- (c) Avoid contamination of the rock underdrains; and
- (d) Prevent formation of voids.

(4) Surface water run-off from the area above the fill shall be diverted away from the fill and into stabilized diversion channels designed to pass safely the run-off from a 100-year, twenty-four (24) hour precipitation event or larger event specified by the cabinet. Surface run-off from the fill surface shall be diverted to stabilized channels off the fill which will safely pass the run-off from a 100-year, twenty-four (24) hour precipitation event. Diversion design shall comply with the requirements of 405 KAR 3:160, Section 1.

(5) The tops of the fill and any terrace constructed to stabilize the face shall be graded no steeper than 1v:20h (five (5) percent). The vertical distance between terraces shall not exceed fifty (50) feet.

(6) Drainage shall not be directed over the outslope of the fill.

(7) The outslope of the fill shall not exceed 1v:2h (fifty (50) percent). The cabinet may require a flatter slope.

Section 4. Head-of-hollow Fills. Disposal of excess rock and earth materials in head-of-hollow fills shall meet all requirements of Sections 2 and 3 of this administrative regulation and the additional requirements of this section.

(1) The fill shall be designed to completely fill the disposal site to the approximate elevation of the ridgeline. A rock-core chimney drain may be utilized instead of the subdrain and surface diversion system required for valley fills. If the crest of the fill is not approximately at the same elevation as the low point of the adjacent ridgeline, the fill must be designed as specified in Section 3 of this administrative regulation, with diversion of run-off around the fill.

(2) The alternative rock-core chimney drain system shall be designed and incorporated into the construction of head-of-hollow fills as follows:

(a) The fill shall have, along the vertical projection of the main buried stream channel or rill, a vertical core of durable rock at least sixteen (16) feet thick which shall extend from the toe of the fill to the head of the fill, and from the base of the fill to the surface of the fill. A system of lateral rock underdrains shall connect this rock core to each area of potential drainage or seepage in the disposal area. Rocks used in the rock core and underdrains shall meet the requirements of Section 3(2)(d) of this administrative regulation.

(b) A filter system to ensure the proper functioning of the rock core shall be designed and constructed using standard geotechnical engineering methods.

(c) The grading may drain surface water away from the outslope of the fill and toward the rock core. The maximum slope of the top of the fill shall be 1v:33h (three (3) percent). Instead of the requirements of Section 2(7) of this administrative regulation, a drainage pocket may be maintained at the head of the fill during and after construction, to intercept surface run-off and discharge the run-

off through or over the rock drain, if stability of the fill is not impaired. In no case shall this pocket or sump have a potential for impounding more than 10,000 cubic feet of water. Terraces on the fill shall be graded with a three (3) to five (5) percent grade toward the fill and a one (1) percent slope toward the rock core.

(3) The drainage control system shall be capable of passing safely the run-off from a 100-year, twenty-four (24) hour precipitation event, or larger event specified by the cabinet.

Section 5. Durable Rockfills. (1) In lieu of the requirements of Sections 3 and 4 of this administrative regulation, the cabinet may approve alternate methods for disposal of hard rock material, including fill placement by dumping in a single lift, on a site specific basis, provided the services of a registered professional engineer experienced in the design and construction of earth and rockfill embankments are utilized and provided the requirements of this section and Section 2 of this administrative regulation are met. For this section, hard rock material shall be defined as rockfill consisting of at least eighty (80) percent by volume of sandstone, limestone, or other rocks that do not slake in water. Resistance of the hard rock material to slaking shall be determined by using the slake index and slake durability tests in accordance with guidelines and criteria established by the cabinet.

(2) Excess rock and earth materials are to be transported and placed in a specified and controlled manner which will ensure stability of the fill.

(a) The method of placement shall be designed to ensure mass stability and prevent mass movement in accordance with the additional requirements of this section.

(b) Loads of noncemented clay shale and/or clay in the fill shall be mixed with hard rock material in a controlled manner to limit on a unit basis concentrations of noncemented clay shale and clay in the fill. Such materials shall comprise no more than twenty (20) percent of the fill volume as determined by tests performed by a registered engineer and approved by the cabinet.

(3)(a) Stability analyses shall be made by a registered professional engineer. Parameters used in the stability analyses shall be based on adequate field reconnaissance, subsurface investigations including borings, and laboratory tests.

(b) The embankment which constitutes the valley fill or head-of-hollow fill shall be designed with the factors of safety in Appendix B of this administrative regulation.

(4) The design of a head-of-hollow fill shall include an internal drainage system which will ensure continued free drainage of anticipated seepage from precipitation and from springs or wet-weather seeps.

(a) Anticipated discharge from springs and seeps and due to precipitation shall be based on records and/or field investigations to determine seasonal variation. The design of the internal drainage system shall be based on the maximum anticipated discharge.

(b) All granular material used for the drainage system shall be free of clay and consist of durable particles such as natural sands and gravels, sandstone, limestone or other durable rock which will not slake in water.

(c) The internal drain shall be protected by a properly designed filter system.

(5) Surface water run-off from the areas adjacent to and above the fill shall not be allowed to flow onto the fill and shall be diverted into stabilized channels which are designed to pass safely the run-off from a 100-year, twenty-four (24) hour precipitation event. Diversion design shall comply with the requirements of 405 KAR 3:160, Section 1.

(6) The top surface of the completed fill shall be graded such that the final slope after settlement will be no steeper than 1v:20h (five (5) percent) toward properly designed drainage channels in natural ground along the periphery of the fill. Surface run-off from the top surface of the fill shall not be allowed to flow over the outslope of the fill.

(7) Surface run-off from the outslope of the fill shall be diverted off the fill to properly designed channels which will pass safely a 100-year, twenty-four (24) hour precipitation event. Diversion de-

sign shall comply with the requirements of 405 KAR 3:160, Section 1.

(8) Terraces shall be constructed on the outslope if required for control of erosion or for roads. Terraces shall meet the following requirements:

(a) The slope of the outslope between terrace benches shall not exceed 1v:2h (fifty (50) percent).

(b) To control surface run-off, each terrace bench shall be graded to a slope of 1v:20h (five (5) percent) toward the embankment. Run-off shall be collected by a ditch along the intersection of each terrace bench and the outslope.

(c) Terrace ditches shall have a five (5) percent slope toward the channels specified in subsection (7) of this section, unless steeper slopes are necessary in conjunction with approved roads.

Section 6. Where the volume of the excess rock and earth materials is small and its chemical and physical characteristics do not pose a threat to either public safety or the environment, the cabinet may modify the requirements of this administrative regulation in accordance with 405 KAR 3:100, Section 2(1), regarding backfilling and grading. (6 Ky.R. 99; eff. 11-7-79; TAm eff. 8-9-2007.)

Appendix A of 405 KAR 3:111 Minimum Size of Underdrain			
Total amount of fill material	Pre- domi- nant type of fill material	Minimum size of drain, in feet	
		Width	Heig ht
Less than 1,000,000 yd ³	Sand- stone	10	4
Do.	Shale	16	8
More than 1,000,000 yd ³	Sand- stone	16	8
Do.	Shale	16	16

Appendix B of 405 KAR 3:111 Safety Factors		
Cas e	Design condi- tion	Minimum factor of safety
I	End of con- struction	1.5
II	Earthquake	1.1